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# Distribution of some important honey plants visited by honey bees for feeding purposes in Narman (Erzurum, Turkey) natural pasture vegetation

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## Abstract

Narman district is located at Eastern Anatolia Region of Turkey. Average altitude is 1650 m, annual total precipitation is about 420 mm. In study area main economic activity is animal husbandry and animal production has made traditional practices, based on rangelands. This study carried out to determine honey plants, frequently visited by honey bees in 20 different locations of Narman. Total 56 plant species were determined and half of these plant species determined as visited plant species by honey bees. Most of honey plant species, determined in locations were wide leafy forbs and some of them were legume species. To determine botanical composition of rangeland vegetation in different locations line intercept method was used. The percentage of all plant species was calculated and each individual honey plant species percentages were determined. Some Alfalfa, Sainfoin, Lotus, Melilotus, Coronilla and Trifolium species were determined in locations. Thymus, Stachys, Centaurea and Campanula species were determined common plant species visited by honey bees.

**Keywords:** Honey bee (*Apis mellifera* L); Honey plant; Legume; Vegetation

## 1. Introduction

The pollination that provide by both wild and managed bees is important for ecological and economical systems [1].

Honey bee is an important beneficial insect to produce honey and use for various purposes such as to pollinate some plant species for production of foods. It is estimated that important part of honey can be used directly in the pharmaceutical industry. Honey bees can enhance agricultural productivity to the 30–80% annually through cross-pollination during foraging for pollen and nectar from flowers of different plant species [2]. Honey bee visits thousands flowers of plants to collect nectar or pollen. Collecting nectar or pollen, honeybees pollinate the visited flowers and helps to increase fruit or seed-setting both in wild and cultivated plants [3], and also, contribute to agricultural production and the maintenance of ecosystems [4].

Pollination interrelationships constitute vital, and often very precise, links in environmental productivity. Human activities are destroying the diversity of all wildlife, and having an effect on food supply, therefore the protection of bees and other pollinators is a critical issue [5, 6]. Intensive agriculture, deforestation, and urban development caused to loss the habitat, available food resources and nest sites for native bee species [7]. Between sustainable agricultural system and the biodiversity of natural environments it is necessary balance is needed Rose et al. [8].

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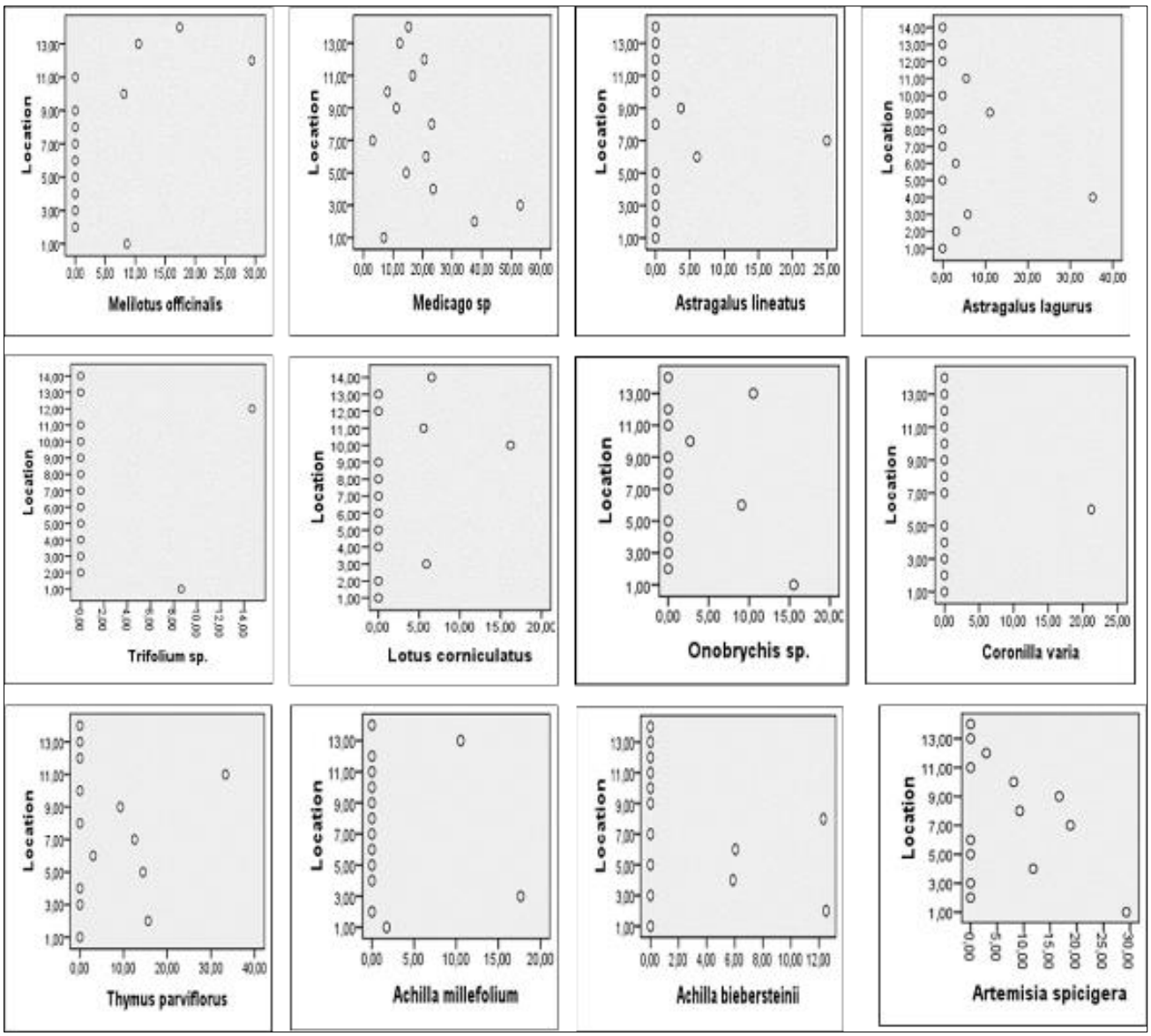
## 2. Material and methods

This study carried out in 14 different locations of Narman district between 2019-2021 years. Study locations were Narman1 (Tuzla): 40°21'1.80"N, 41°52'37.53"E; Narman2 (Meheng): 40°21'42.43"N, 41°55'22.46"E; Kuruçalı: 40°23'28.43"N, 41°54'42.53"E; Araköy: 40°22'56.72"N, 41°56'28.04"E; Kışla: 40°17'36.25"N, 42° 0'46.09"E; Serinsu: 40°21'16.99"N, 41°59'47.22"E; Mahmutçavuş: 40°20'35.01"N 41°57'9.39"E; Yanıktaş: 40°16'21.03"N, 41°51'44.24"E; Göllü: 40°14'9.55"N, 41°52'24.82"E; Kamışözü: 40°19'35.42"N 41°48'26.98"E; Karapınar: 40°17'12.97"N, 41°41'42.55"E; Sapanlı: 40°20'36.32"N 41°45'44.05"E; Karadağ: 40°20'50.95"N, 41°46'35.66"E; Beyler: 40°21'29.42"N, 41°47'59.03"E.

From the beginning of flowering time to end, on vegetation visiting of honeybees was observed, identified and took the pictures. Some plant species unidentified during sampling period, identified by Botanist. Line intercept method Canfield [9] was used and individual plant ratios were calculated for each study locations.

The spatial distribution of honey plant species were given as figures and honey plant species were compared among locations by using a one-way ANOVA (SPSS 20.0 for Windows). Based on statistical analysis results, honey plant species showed significant distribution at different study locations.

## 3. Results and Discussion



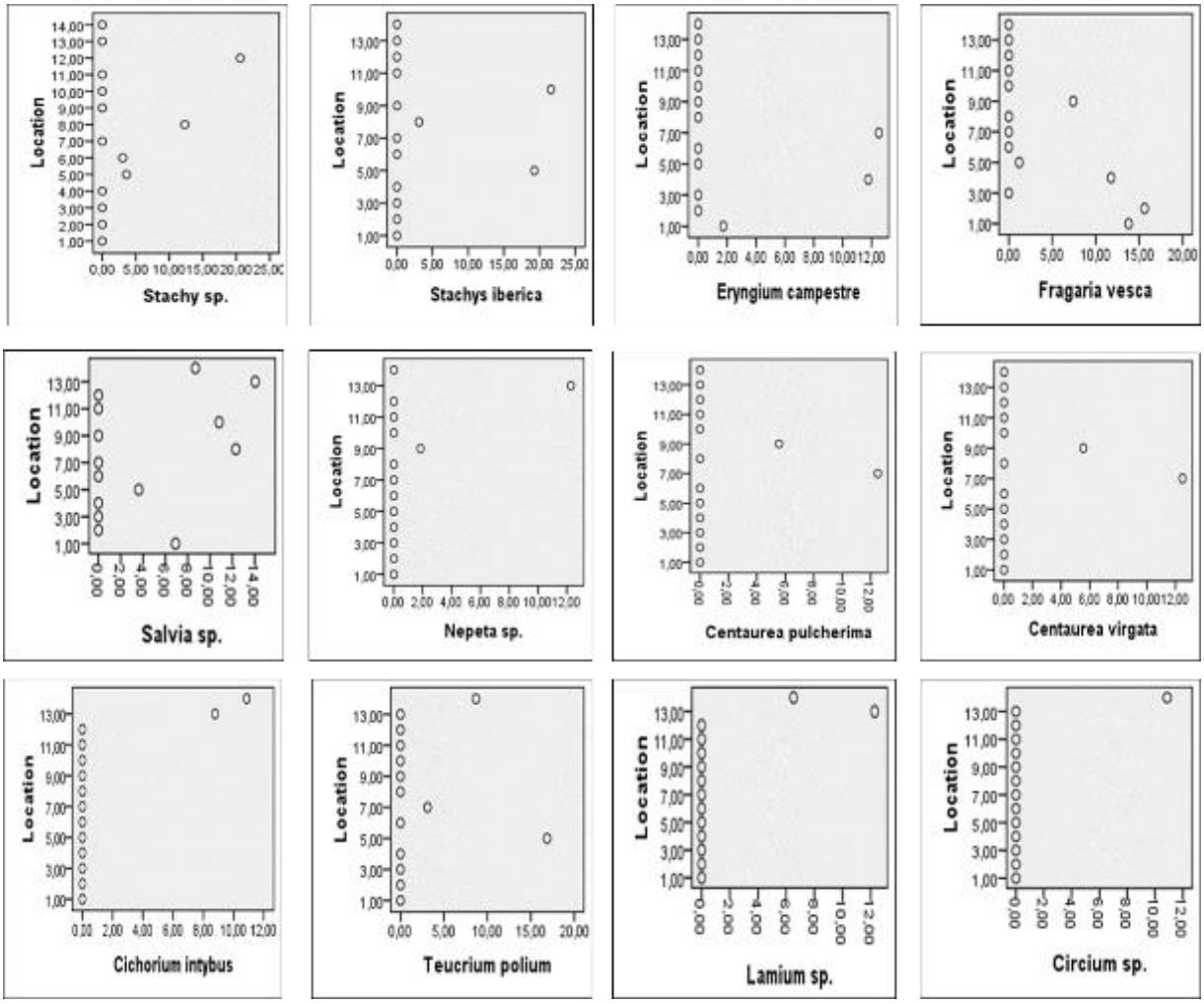



**Figure 1** Distribution of honey plant species in study locations

According to the results of this study, total 27 flowering plant species were determined as flowering plants that visited by honeybees. Most of them were belong to the other families.

Most abundant legume plant species was *Medicago varia*, encountered in all locations. After this species, the second abundant legume species was *Astragalus lagurus*, encountered in 6 locations. The other legume species were *Melilotus officinalis*, *Medicago sativa*, *Astragalus lineatus*, *Trifolium sp*., *Lotus cornuculatus, Onobrychis sp., Coronilla sp.* encountered in study locations. The most common other families plant species were *Artemicia specigera*, *Thymus parviflorus*, encountered in six locations; *Crepis sp., and Fragaria vesca*, encountered in five locations (Figure 1 and Figure 2).

Studies show that honey obtained from different sources and plant species shows different activities for human health [10]. Legume and the other flowering species are important for beekeeping and honey production due to having attractive flower, pollen and nectar. From these species, important amount honey is produced each year in different country of the World [11, 12, 13]. In one study, 25 taxa belonging to 16 families were identified as honey plants. Among the most common family Fabaceae, after it was found that Asteraceae and Poaceae Zandamela [14]. In a study to determine the plant species that are important for honey bees in the Thrace region, 301 species belonging to 70 families were identified [15]. In another study where pollen dominance was examined, it was found to belong to Astragalus, Acanthussp, Celastraceae, Brassicaceae families [16]. As a result of qualitative and quantitative analyzes of pollen types, 28 pollen types were determined. Among these pollen types, *Eucalyptus* sp. and *Psidium* sp. are the most intense. Secondly, *Bauhinia* sp, *Caesalpinia* sp. and *Mimosa verrucata* were detected [17]. In a study of botanical origin, about 73% of the pollen was determined from nectar plants and the remaining were from pollen or pollen and honey extract plants Combarros-Fuertes et al [18]. It is stated that bees provide at least 5% of their pollen needs from one of thyme, rosemary and lavender species [19]. In the results of some study that conducted in different years in the same region of Spain, Valencia-Barrera et al [20] found Ericaceaean and Rosaceae families and Hypecoum imberbeor, Lotus sp.,

Capsella bursa-pastoris, Halimium halimifolium, plants were predominant while [21] found chestnut honey (*Castanea sativa*) and thyme honey (*Thymus* sp.) were predominant. In a study conducted on eighty-seven uniform flora and 63 mixed flora honey samples, the most common pollen types were; *Arbutus*, *Asphodelus*, *Galactites*, *Carduus*, *Lavandula*, *Rosmarinus* have been identified [22]. The variability of pollen species found in the different samples examined is a result of different floral and geographical origins as well as climate variability [23].


**Figure 2** Some plant species frequently visited by honeybee in study locations

The phenolic acids and flavonoids are considered potential markers for the botanical origin of honeys and they are phenolic compounds in the honey [24]. The botanical origin of honey is known to have the greatest effect on the phenolic content and thus on the antioxidant activity White [25]. The ability and potential of honey's antioxidant activity is important to reduce oxidative reactions for food systems and human health [26]. Honey naturally contains antioxidants and its reveals the antioxidant capacity of honey. Also, the floral sources used to collect honey are related with the phenolic profile of honeys and their antioxidant capacity [27]. It is known that the botanical origin of honey is highly important on phenolic content and therefore antioxidant activity, and that some honeys are of higher quality than others.

## 4. Conclusion

According to the results of this study, the distribution to working locations of 27 flowering plant species visited by honey bees was determined. Flowering plant species identified in the study area are very important species for beekeeping. According to the results obtained, it shows that the study area has sufficient flora in terms of nectar and pollen sources. This suggests that flowering plants in natural flora need to be protected for sustainable beekeeping and honey production.

## Compliance with ethical standards

*Disclosure of conflict of interest*

There is no conflict of interest between the authors.

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